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(72) Inventor KENNETH CONSTERDINE

(19)

(54) TRANSFER SHEETS FOR USE IN HEAT TRANSFER PROCESSES

(71) We, BEMROSE SPENDON LIMITED, a British Company of P.O. Box 76 Raynesway, Derby, DE2 7BL, do hereby declare the invention for which we pray that a patent may be granted to us and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention relates to transfer sheets for use in heat transfer processes.

It is known to print substrates, such as textiles, by hot transfer from a transfer sheet having a transfer layer incorporating a vapour-phase transfer or sublimable dye. Such a process is described in U.K. Specification No. 951,987 and examples of suitable dyes are quoted in U.K. Specifications Nos. 1,221,126 and 1,254,021.

There are, however, problems associated with such transfer sheets, such problems starch-based material and applying to said coating a transfer layer incorporating a vapour-phase transfer material.

The support layer may comprise for example a plastics material, or may be a paper sheet. The starch or starch-based material may be unmodified, i.e. relatively insoluble in cold water, or may be modified in order to render it water-soluble, for example by acetylation, chlorination, acid hydrolysis or enzymatic action to produce modified starches in the forms of acetates, esters or ethers.

If desired, of course, mixtures of unmodified starches may be used in order to give optimum results. Additives may also be included, for example, additives which assist film-formation. Suitable additives include hydroxyethyl cellulose, polyvinyl alcohols, polyvinyl acetates, polyacryates, butadiene acrylonitrile, oxidised potato starch and galacto mannans.

The coatings may also include an alginate which assists film formation and helps reduce "pin-hole" effects. The alginate may be, for example, a sodium, potassium, calcium or propylene glycol alginate and may be present in an amount 1-10% by weight based on the dry weight of starch material, preferably in an amount 2 to 8% by weight.

ERRATUM

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2-20% by weight of solid material based on the weight of solution. Preferably, the solution contains 5 to 15% and more preferably 8 to 10% solid material. The coating generally should be such as to give a dry weight of coating of 1.5 grams to 6.0 grams per square metre.

In one preferred embodiment of the invention the support for a heat transfer sheet comprises a paper support layer and a coating of a starch-based material com-

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This invention relates to transfer sheets for use in heat transfer processes.

It is known to print substrates, such as textiles, by hot transfer from a transfer sheet having a transfer layer incorporating a vapour-phase transfer or sublimable dye. Such a process is described in U.K. Specification No. 951,987 and examples of suitable dyes are quoted in U.K. Specifications Nos. 1,221,126 and 1,254,021.

There are, however, problems associated with such transfer sheets, such problems including "pin-hole" effects in certain patterns and also a tendency for dye "set-off" during storage of the transfer sheet in reel form.

According to one aspect of the present invention a transfer sheet for use in a heat transfer process comprises a support layer having a coating of a starch or starch-based material and a transfer layer incorporating a vapour-phase transfer dye.

According to another aspect of the invention a method of producing a heat transfer sheet as defined above comprises coating a support layer with a starch or starch-based material and applying to said coating a transfer layer incorporating a vapour-phase transfer material.

The support layer may comprise for example a plastics material, or may be a paper sheet. The starch or starch-based material may be unmodified, i.e. relatively insoluble in cold water, or may be modified in order to render it water-soluble, for example by acetylation, chlorination, acid hydrolysis or enzymatic action to produce modified starches in the forms of acetates, esters or ethers.

If desired, of course, mixtures of unmodified starches may be used in order to give optimum results. Additives may also be included, for example, additives which assist film-formation. Suitable additives include hydroxyethyl cellulose, polyvinyl alcohols, polyvinyl acetates, polyacryates, butadiene acrylonitrile, oxidised potato starch and galacto mannans.

The coatings may also include an alginate which assists film formation and helps reduce "pin-hole" effects. The alginate may be, for example, a sodium, potassium, calcium or propylene glycol alginate and may be present in an amount 1-10% by weight based on the dry weight of starch material, preferably in an amount 2 to 8% by weight.

Generally the coating may be applied to the support by any suitable coating method such as size press, Myer bar, air knife, blade coating or back coating and where the support layer is of paper any coating method used in paper making, either in-line or out-of-line with the paper making machine, may be used.

If desired the coating may be applied as the first stage in a printing process prior to printing the transfer layer, for example, by means of an engraved roller.

Preferably the coating is applied in the form of an aqueous solution containing 2-20% by weight of solid material based on the weight of solution. Preferably, the solution contains 5 to 15% and more preferably 8 to 10% solid material. The coating generally should be such as to give a dry weight of coating of 1.5 grams to 6.0 grams per square metre.

In one preferred embodiment of the invention the support for a heat transfer sheet comprises a paper support layer and a coating of a starch-based material com-

prising COTTOSINT 9550 supplied by Henkel & Cie GmbH. Such a support layer is then used to receive any suitable heat transfer ink to produce a heat transfer sheet.

The coating of starch or starch-based material is applied to the support prior to the application of the transfer layer. A further coating may also be applied over the transfer layer which has certain advantages including reduction of dye set-off during storage of the transfer sheet in reel form.

EXAMPLE 1

A paper sheet was coated with a solution of COTTOSINT 9550 to give a dry weight of 3 grams per square metre using a blade coating technique. The coating was dried and a transfer layer applied to the coated paper.

The resulting transfer sheet was found to give good transfer properties and no significant "pin-hole" effects were noted.

EXAMPLE 2

A paper sheet was coated with a solution of the following composition:

2 parts by weight SOLVITOSE C5 26% solution

1 part by weight MANUTEX RS 1 — 4% solution

SOLVITOSE (registered Trade Mark) is a starch ether supplied by Sholtens Chemische Fabrieken B.V. and MANUTEX (registered Trade Mark) is a sodium alginate solution supplied by Alginate Industries Limited.

A blade coater was used to apply the coating to the paper sheet to give a dry weight coating of 3 grams per square metre. A heat transfer layer was then applied to the coated paper.

The resulting transfer sheet was found to give good transfer properties and no significant "pin-hole" effects were noted.

We have found that the present invention produces an improved release of the vapour-phase transfer dyes from the support particularly from paper supports. Furthermore, the permeability of the paper to the dyes is inhibited.

In addition we have found that the invention substantially reduced dye mark-off on the printed substrates and ink set-off on the back of the supports of the transfer sheet.

The use of a coating of starch or starch based material according to the invention also tends to eliminate shade differences in paper quality so that the only shade differences which tend to remain are those due to the difference in the heat conductivity of the base papers.

Furthermore, the support layers of the invention are particularly useful when used with dyes which are affected by trace materials present in the paper. Thus, for example, certain disperse dyes are affected by dye-trace metals such as alumina in certain papers.

WHAT WE CLAIM IS:—

1. A transfer sheet for use in a heat transfer process comprising a support layer having a coating of a starch or starch-based material and a transfer layer incorporating a vapour-phase transfer dye.

2. A transfer sheet according to Claim 1 in which the coating of starch or starch-based material includes additive for assisting film formation.

3. A transfer sheet according to Claim 2 in which the additive is hydroxyethyl cellulose, polyvinyl alcohol, polyvinyl acetate, a polyacrylate, butadiene acrylonitrile, oxidised potato starch or a galacto mannan.

4. A transfer sheet according to any of the preceding claims in which the coating of starch or starch-based material includes an alginate.

5. A transfer sheet according to Claim 4 in which the alginate is present in amounts of 1 to 10% by weight based on the dry weight of starch or starch-based material.

6. A transfer sheet according to Claim 5 in which the alginate is present in an amount of 2 to 8% by weight based on the dry weight of the starch or starch-based material.

7. A transfer sheet according to any of Claims 1 to 6 in which the dry weight of the coating is 1.5 to 6 grams per square metre.

8. A transfer sheet for use in a heat transfer process substantially as herein described in either of the examples.

9. A method of producing a heat transfer sheet as claimed in any of Claims 1 to 8 which comprises coating a support layer with a starch or starch based material and applying to said coating a transfer layer incorporating a vapour-phase transfer material.

10. A method according to Claim 9 in which the starch or starch-based material is applied in the form of an aqueous solution.

11. A method according to Claim 10 in which the aqueous solution contains 2 to 20% by weight of solid material based on the weight of solution.

12. A method for producing a support for producing a transfer sheet or the transfer sheet for use in a heat transfer process substantially as herein described.

ERIC POTTER & CLARKSON
Chartered Patent Agents
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Nottingham.

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